PM-ISE Workshop for Information Sharing and Safeguarding Standards (WIS^3)

Appendix D – WIS3 Breakout Track 4

Translation of Business Requirements to Technical Architectures

Panelists

Name	Organization	Role / Presentation
Larry Johnson	OMG	Moderator
Bill Wright	SAIC	DNDO's Approach to Data Interoperability
Daniel Brookshier	No Magic	UPDM – Unified UML Profile for DoDAF/MODAF
Patricia Hammar	PKH Enterprises	Privacy Policy Automation
Mike Abramson	ASMG	IEF – Information Exchange Framework
Vijay Mehra	PM-ISE	Facilitator
John Butler	Everware-CBDI	Scribe

Presentation 1 – Interoperability Standards and Capabilities for the Global Nuclear Detection Architecture by Dr. W. R. Wright, DNDO

In the NIEM CBRN domain (Chemical, Biological, Radiological, and Nuclear Domain) there are 10 major data classes which are used in 9 types of messages constituting 51 messages. The messages focus on "cargo & conveyances" and are collectively included in the N.25 standard specifying NIEM XML messages for RadNuc detection. There are plans to "NIEM-ify" other existing standards such as N42.42 Radiation Data Format Standard currently under international review for release as an IEC standard. Other standards of interest for future work and harmonization are: Common Alert Protocol (CAP), Law Enforcement – NIEM conformant (LEXS), ATP-45 of the NATO/DoD, and Transportation Management (TMDD). Mr. Wright outlined the DNDO's approach to using a "Messaging Appliance" to accommodate messages from other standards by mapping them to NIEM compliant models. They are establishing a Community of Interest and a governance process for the work. Other future work was described.

Presentation 2 – UPDM – Unified UML Profile for DoDAF/MODAF by Daniel Brookshier, No Magic

Mr. Brookshier provided a brief overview of the Unified Profile for DoDAF and MODAF (UPDM) which use a UML Profile. A UML profile is a specification that provides extensions to

the Object Management Group's Unified Modeling Language (UML). Profiles extend pre-existing UML tools to model in other notations using the concept of "stereotypes." In the case of UPDM, the U.S. Department of Defense Architecture Framework (DoDAF), and the U.K. Ministry of Defence Architecture Framework (MODAF) are made available through modeling tools supporting UML Profiles. He presented a few examples of the use of a DoDAF using the tool "Magic Draw" which is produced by his company. DoDAF and MODAF are of interest in themselves in the military community, but are also finding great interest among the Civilian Agencies and the Office of Management and Budget (OMB). However, of particular interest to all attending is that the ISE community is working in the OMG to author a "NIEM UML" profile specification. On completion, NIEM will have broad automation support, both in terms of modeling MPDs and their IEPDs, in the actual generation of NIEM-compliant artifacts.

Mr. Brookshier was asked, as it seems there are a number of representations for architectures and solutions and with advances in semantics, if he sees commonality across multiple groups to advance the use of semantic technology to enhance interoperability and on the status of getting semantics in UPDM. He responded that one of the biggest problems is that you often have to involve "semantic techies". As a modeling community, we are beginning to take things from architectures and expanding them into ontologies using representations like OWL and RDF. Because of the tooling (use of profiles and meta-object facilities) domain users can use the tools with which they are familiar.

Presentation 3 – Privacy Policy Automation by Patricia Hammar, PKH Enterprises

Ms. Hammar presented background on the Controlled Homeland Security ISE (CHISE), the goal of which is to provide a sustainable method to share information, in an architecture supportive of our privacy and legal requirements, under DHS control, accessible by the IC enclaves on classified networks. The benefits of CHISE were discussed, emphasizing efficiency, control, and scalability. Some of the challenges of translating human readable policy to uniform XML policy sets were described as well as privacy activities including:

- Federal Privacy Dictionary
- Business Process Analysis
- NIEM Data Tagging Analysis
- Privacy Enabling Technologies Roadmap

Presentation 4 – IEF - Information Exchange Framework by Michael Abramson, ASMG

Mr. Abramson provided a quick overview of the Object Management Group's Information Exchange Framework, the objectives of which are:

- Alignment of standards to support the development and sustainment of semantic interoperability
- Focus on information content rather than mechanisms for distribution
- Separate business rules from the software applications and services that enforce them, providing:
    - increased flexibility, adaptability and agility
    - Increased retention of institutional knowledge and Memory
    - Increased traceability and audit-ability of information sharing and protection solutions
- IE Policy Enforcement Support for multiple communities (NIEM, CAP, MIP, …)
- Model Driven Architecture (MDA) services
- Simple approach to modeling messaging, semantic and transactional patterns

A useful application of IEF Policy Enforcement is NIEM by providing a mechanistic framework to describe and enforce policy. NIEM provides static models providing a "vocabulary" and "standard format". IEF will assist ISE in providing specification of a range of rules and behavior once the data are in motion. The reader is encouraged to access the presentation itself which has a great deal of material which is frequently annotated with explanations.

The panel was asked, “How do you verify that what you've done from an information viewpoint is what the stakeholders and end users want?” Mr. Abramson responded that the collaboration must include continuous and repeated re-visitation of the artifacts to assure that the models meet current requirements (they do tend to change.) Mr. Brookshier agreed, stating that this helps ensure that the data model represents the real world. Ms. Hammer stated that GSA/Office of Government-wide Policy is currently looking into what can be done to structure and represent policies and then simplify wherever possible.

Breakout Discussion

To accommodate the large number of participants, index cards were distributed and each participant was asked to record a question which needs to be answered, an issue that needs to be addressed, and/or a specific recommended action that needs to be taken to advance *Translation of Business Requirements to Technical Actionable Architectures*. The returned cards were organized into the following topical groups:

- *Transformation of Requirements to Business Architecture*
  This was the "Title topic" of the session, but there was a great deal of interest in other topics in the short period of time we had.
- Common Life-Cycle View
- Semantics in Multiple Domains and Their Evolution
- Sharing Across Security Domains

- Governance
- Managing the Velocity of Uptake
- What does this breakout request of the PM-ISE?

The following discussion is documented as:

Opening Comments (from the Index Cards filled in by participants).
Discussion (a synopsis of the major points in the discussion)
Summary (a synopsis of the discussion).

Transformation of Requirements to Business Architecture

Opening Comments:

- How can we use OMG's Model Driven Architecture technologies to more quickly implement standards once adopted?
- What are the operational requirements of transforming business requirements into technical architecture? How do we identify and prioritize mission views?
- How can we leverage lessons learned & best practices of MDA work to date to better inform the Information Sharing Community providing better access & visibility to products & efforts?
- Architecture should be executable, not actionable.
    - Executable architectures (specifications) can be checked for consistency by machines
    - Consistency reduces cost of interoperability.
- We need a common architecture for information sharing model.
- Are we focusing on the right standards? Given that most access/share of data is done using the web, it seems that the only standard that matters is the web standards (http, html, xml). Shouldn't the emphasis be on linked data and the semantic web? Architects must move from standards for development to interoperability.
- How do we accelerate the development, adoption & use of Reference Exchange Standards (e.g., Functional Stds, Reusable Business Components, Transaction Paths, and Messaging)?

Discussion:

- Ubiquitous information sharing requires an ubiquitous communications backbone. That exists in most of the "wired world". What is the position of the Information Sharing Community on pervasive, reliable, high bandwidth wireless communications? This has specific implications on the "D" block.
- It seems that there are multiple programs that leverage standards to enable cross-system information sharing but:

    - No functional model to enable a Federal Agency to provide services to external (non-federal) stakeholders.
    - In spite of various E-Gov initiatives drawing services across multiple Federal agencies, it appears that the ability of the Federal government to support the ability of state and local governments to access and use these solutions is very limited.
    - It isn't that hard to put a standards-based enterprise capability in place that enables a system of systems or a network of networks – people need it and want it. But if Federal IT security and processes make it prohibitive to participate, the actual stakeholders will not be able to join. I have been amazed at just how hard state & locals will work to participate in these solutions, but ultimately it is the Federal side that is continually closing the door and not enabling.
    - How will we embrace state & local participation?
- Although the W3C standards are crucial to information sharing, they only go part of the way toward articulating the architectures we need. UPDM, UML, SOAml are just a few of the needed standards that go beyond W3C standards, but work with them as platform specific definitions and deployments. NIEM and OASIS standards focus on W3C underpinnings, but their standards also extend to describe the models needed for particular domains and horizontal capabilities.
- The OMG's Model for Performance-driven Architecture (MPG) was, in part, the beginning of defining a class model which could be extended to shared-services. We need to take this next step.

Summary:

- When defining architectures from business requirements there is often too much emphasis on Federal Requirements to the neglect of State and Local Requirements. NIEM has made strides to avoid this mistake and we need to take this lesson through our other models, frameworks, and services. In defining these artifacts to achieve interoperability we need to draw from the tool belts of major standards organizations such as ISO, OMG, OASIS, NIEM, etc.

Common Life-Cycle View

Opening Comments:

- Establish/agree on a common view of life-cycle from Need -> Solution -> Performance. This could help shift focus to mission & mission commander or leader, who really just needs "ready" resources to apply to their mission. UPDM (OMG's Unified Profile of DoDAF and MODAF) has one view of much of the life-cycle. The common view could

help focus application of standards, identification of gaps of coverage with standards, etc.

- Can we look at converging the OMG's Model for Performance Driven Government specification into UPDM? How would one make such a decision and express the value?
- Enterprise Architecture has Framework, Reference Models, and Practice Guide to support the EA life-cycle implementation. What is the information sharing life-cycle process? How do we coordinate the two life-cycles?
- Are there any use cases that are examples of better ways for building & implementing the needed standards? (Is UPDM such an example?)

Discussion:

- While some felt there was a need to agree on a common life-cycle, it was noted that different communities may require different life-cycles depending on their requirements.
    - In the OMG's Model for Performance-driven Government, the idea was to look at various related activities such as IT dashboard, CPIC, etc. In creating the model, we observed that we're fragmented across areas of government and we need to converge.
    - There is a fair degree of overlap among various models. If we could have integrated tools we'll have better integration and be better able to use the information.
    - Does it make sense (or is it even possible) to merge these various models?
- We have system related life-cycles but we need to show, down the road, the performance of the programs.
    - The life-cycle, however agreed on, needs to have metrics that track the efficacy of the system against its objectives.
- While UPDM is very useful in partitioning viewpoints, including life-cycles, OMG's SPEM (Software & Systems Process Engineering Metamodel) is a life-cycle metamodel that also applies. It has a really valuable view for acquisition of solutions. It's about how we manage the LC of software intensive systems.

Summary: The consensus was that there needs to be commonality in a view of the software life-cycle; however, a one-size-fits-all approach would probably not work across the broad communities we are addressing. Whatever merging or sharing of these views we can accomplish will be a plus. Tools using specifications such as OMG's UPDM and SPEM can help standardize the language of these harmonizations and consolidations.

Semantics in Multiple Domains and Their Evolution

Opening Comments:

- How do you resolve naming structures/terminology between different agencies with different goals but who still need to communicate and share information, e.g., Law Enforcement and Transportation?
- How will we manage not only changing data, but changing meanings of the data over time?
- Issue: Technology evolves rapidly. What are some considerations an agency should think about regarding whether or not to update a published IEPD? (e.g., cost, time, etc.)
- Issue to resolve: Cross Domain Info Sharing
    - Tools to develop: I would like to see a tool that allows for a user to select 1) the Domain and 2) the Business Function, and then 3) autogenerate the required XML & classes for the exchange of the information. An example would be 1) Domain = Cyber, and 2) Business Function = Incident Report, then 3) Auto generate Client to use the Business Function.
- How should versioning be handled?
- Since semantic understanding is relative to context, how would we get standards to address "true" data analysis (3rd & 4th order normalization), attribute depth, and contextual use?

Discussion:

- This is the fundamental issue that NIEM was meant to address; however, the issue of overlapping IEPDs is a tricky one. When the same semantic concept is in two or more IEPDs, there is danger that the same terms will evolve into different contexts.
- We need to have a common vocabulary for terms and policies. We have to transform terms into and out of domain. Need to understand how to store that as well.
    - Today's solution so far is limited to establishing a Thesaurus among the IEPDs. This becomes inadequate when there are no one-to-one bidirectional mappings among the semantics underlying the terms.
    - IEF is trying to address the mapping of terms across domains.
    - Complicating things, the semantics of a term in a single domain can evolve over time. In the health care domain there are difficulties in the study of long term epidemiological data because the meaning/definition of a particular metric or diagnosis has evolved over time.
- Going forward, refactoring will need to be a constant activity as NIEM evolves. There needs to be an authoritative source which can identify such overlaps and manage their refactoring.

- We will need to move beyond IEPDs to Service Specifications as the definitive context of what an exchange is all about.
- We need a repository for sharing architectures backed with ontology. It needs to be open and also able to secure detailed information. Should use XMI and XML for information linked to semantic descriptions.

Summary: Semantic harmonization will need to become an ongoing activity through re-factoring. The re-factoring will need to be guided by an understanding of the contexts in which the information is being exchanged and assure each IEPD meets that need. Registries of interchange ontologies linked to repositories would enable wider sharing.

Sharing Across Security Domains

Opening Comments:

- How do we handle sharing information across security domains?
- How do we find the balance between providing individuals with solutions to security and protect their personal information (health data, location, activity tracking, etc.), honoring their personal preferences while there is the pressure to have government to have access to keep the nation safe?

Discussion:

- Using filters, we can block off pieces that shouldn't be shared. Build data into a message specific to that exchange.
- We need to tag the information as it is being pulled together in an exchange message. However, to do so we are going to need to know several things:
    - Intrinsic classification of the data (datum by datum and in combination)
    - Purpose of the exchange
    - Identity and Role of the Provider and Consumer of the information
- NIEM is addressing some of these items. In the example of Personally Identifiable Information (PII), when two or more pieces of information are put together that constitute "identity," then they are considered "classified".

Summary: NIEM has made progress in areas of security protections that involve the data alone. Work needs to be done so that security policies can be applied to the purpose of the exchange transaction and the identity/role of the consumers and providers.

Governance

Opening Comments:

- Need to establish an IE Framework which is not dependent on being DoD, DHS, State, or Federal. It should be useable by all. This IE Development requires governance.

- A model for Governance that assures equal representation of stakeholders.
- Governance: how can we move the world of CM to management of data related artifacts?

Discussion:

- The overall governance and management of data is difficult. One of the problems is that no one is Google (but, of course, Google). How do we make sure we have the bigger repository and discovery tools that work across domains?
- Do we need every query to go across every domain? If not, do we need to manage all information under a single governance plan? Do we need a governance of governance plans?
- A repository that has everything is likely impractical.

Summary: Governance of Information Exchange Framework(s) needs to be addressed. There is currently a push back on "systems of systems;" the push will likely be harder on governance of governance plans. Will a single framework/governance work? If not, what are our options?

Managing the Velocity of Uptake

Opening Comments:

- What is the role of the tools community in accelerating Governance conversations, reducing the overhead & increasing the value of possible governance decisions?
- How do we incentive the sharing or "giving back" to the information sharing community to increase the reuse of and for the promulgation of standardized information exchanges?
- What are realistic time frames within which to require that the newest standards are implemented?
- How much do financial constraints impact adoption & implementation? Is this well understood & are these initiatives funded adequately?
- What are the best ideas to pilot and accelerate the work Patricia Hammar described? *[Editors Note: See her presentation above.]*
- Who has the hammer, i.e., how do you make people use standards?
- Given different ways to represent architecture (FEA, DoDAF, etc.), how do we plan to standardize this?

Discussion:

- For information sharing to work, organizations must define what data they want and are willing to share. This must match the data others want to consume. We need to start there and then explore commonalities before we can generate useful standards.

- Who has the hammer (stick)? What are the incentives (carrot)?
- Carrots
    - Information – Those that need information from others see that value immediately. Those that have information don't always have a vested interest in providing or stewarding it. We need to create an environment of reciprocity.
    - Money (At the top level you express the policy and then build it into the budget)
- Sticks
    - If you push for sharing too hard, it can raise defenses. Establish a program in which the sharing is gradual. As sharing information shows value, over time all can get more.
    - Holding back some amount of budget and then awarding that to programs that are innovating and performing better.
    - If people are forced to give access before they trust that their data will not be misused against them, they will often "go off the grid" or decide not to do things they should do.
- Related to the discussion of governance and semantic evolution:
    - There is concern about "whip-sawing" implementing agencies responsible for producing and consuming information. How soon do new releases need to be promulgated? Too soon and there is a big overhead in coordinated deployment cost (across all producers and all consumers). If current needs are met by superseded standards, are the old working ones good enough? When is too old, too old?
- Technology is not the issue. We can develop interfaces and use metadata to integrate. The problem is organizational, policy, politics, and business.

Summary: While there are compelling reasons to proceed "as fast as possible," planning must take into account the ability to absorb the new. Anything that makes "newness" more easily digestible is desirable. Make agencies aware that the information they share makes their mission more valuable, as the information they consume makes their mission more viable.

What does this Breakout request of the PM-ISE?

Opening Comment:

- What does this breakout need from the PM-ISE?

Discussion and Summary:

- We need a clear commitment from the government (PM-ISE) backed up with strong direction.

    - We need a projection of ISE policy at the highest level that has enforcement and inducements in it.
    - The PM-ISE can provide assistance in achieving Executive Level Buy-In & prioritization on information sharing. Identify the barriers to this and provide a strategy and action to overcome them.
- Provide incentives to share.
    - In pursuing the ability to collaborate and cooperate across functional and geographical physical boundaries it is imperative that all participants recognize that there is no one "winner". All solutions must derive toward common goals. It seems that too many organizations (both vendor and business owners) are primarily focused on building or owning the panacea "theme".
    - Stewardship of data. Want to encourage organizations to share. Didn't start with the intent to share the data.
    - Assure there is sufficient funding at the outset of a program or initiative to build data sharing capability into it from the outset. Build it into the requirements.
- Provide enablement of sharing. Make it easy.
    - Help establish a market for standards-based sharing of information both in terms of the need for the information and for the tools that can support it.
    - You get what you measure. We need a set of "sharing" metrics that can be published out.
    - Reduce the financial (and other resource) barriers to entry.
- Leadership involves ongoing conversation with users, vendors and standards organizations; participation directly in standards organizations; and carrots & sticks that directly incent adoption of standards (in RFPs, announced & required standards, etc.)

Breakout Summary

Transformation of Requirements to Business Architecture – When defining architectures from business requirements there is often too much emphasis on Federal Requirements to the neglect of State and Local Requirements. NIEM has made strides to avoid this mistake and we need to take this lesson through our other models, frameworks, and services. In defining these artifacts to achieve interoperability we need to draw from the tool belts of major standards organizations such as ISO, OMG, OASIS, NIEM, etc.

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Semantics of Multiple Domains and Their Evolution – Semantic harmonization will need to become an ongoing activity through re-factoring. The re-factoring will need to be guided by an understanding of the contexts in which the information is being exchanged and assure each IEPD meets that need. Registries of interchange ontologies linked to repositories would enable wider sharing.

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Governance – Governance of Information Exchange Framework(s) needs to be addressed. There is currently a push back on "systems of systems;" the push will likely be harder on governance of governance plans. Will a single framework/governance work? If not, what are our options?

What Does This Breakout Request of the PM-ISE?

- We need a clear commitment from the government (PM-ISE) backed up with some strong direction to corral the "kitties".
    - Would be helpful to have an ISE policy at the highest level that has a hammer in it.
- Provide incentives to share.
    - In pursuing the ability to collaborate and cooperate across functional and geographical physical boundaries it is imperative that all participants recognize that there is no one "winner." All solutions must derive toward common goals. It seems that too many organizations (both vendor and business owners) are primarily focused on building or owning the panacea "theme."
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